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Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of:
Erik Surewaard et al.

Serial No. 10/720,634 Group Art Unit: 3681

Filed: 11/24/2003 Examiner: Pang, Roger L.

For: LOCKING MECHANISM FOR THE CRANKSHAFT OF AN INTERNAL COMBUSTION ENGINE

Attorney Docket No. 81044753

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Date: 02/20/06

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BRIEF ON APPEAL

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

The following Appeal Brief is submitted pursuant to the Notice of Appeal dated December 19, 2005, for the above-identified application.

I. Real Party in Interest

The real party in interest in this matter is Ford Global Technologies, LLC, which is a wholly owned subsidiary of Ford Motor Company, both of Dearborn, Michigan (hereinafter "Ford").

II. Related Appeals and Interferences

There are no other known appeals or interferences which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of the Claims

Claims 9-11 stand rejected in the Final Office Action.

IV. Status of Amendments

No claim amendments were filed following the final rejection.

V. Summary of Claimed Subject Matter

The present invention is directed toward a method for shutting down an internal combustion engine, including stopping the engine in a predetermined rest position, such that motoring torque is decreasing during the first phase of restarting. The engine crankshaft is locked in the predetermined rest condition by means of a locking mechanism which prevents engine rotation.

As shown in Figure 3 of Applicants drawings, and as set forth at page 6 of Applicants' specification at lines 14-34, engine cranking torque is determined by the engine design as a minimum value the cranking device should deliver. The torque needed to move the engine when the first compression is encountered is influenced by the initial position of the crankshaft. Figure 3 shows that motoring torque through the first compression, of a typical engine at a cold cranking temperature of -29^{0}C, is affected by initial cranking angle. Of the three curves shown in Figure 3, one curve shows that at a certain at optimal crank angle between 45 to 80 degrees prior to top dead center (TDC) on the compression stroke of the engine, lower compression pressure results in a lower motoring torque. Thus, starting is facilitated. Note that Applicants teach stopping of the engine on the compression stroke. The importance of this factor will be set forth below.

VI. Grounds of Rejection to be Reviewed on Appeal

Are Claims 9-11 properly rejected under 35 U.S.C. 103(a) as being unpatentable over *Janczak et al. (5,070,266)* in view of *Downs et al. (6,453,864)*?

VII. Argument

The Rejection of Claims 9-11 under 35 U.S.C. § 103(a) over *Janczak et al.* in view of *Downs* is not sustainable.

The Examiner states that *Janczak* teaches a method for shutting down an ICE and for locking the engine in a predetermined rest condition. The Examiner admits that *Janczak* lacks any specific teaching of a defined starting position. For this, the Examiner looks to *Downs*, which the Examiner asserts as teaching a method of stopping the engine at predetermined rest position defined such that motoring torque is decreasing during the first phase of restart. The Examiner cites column 4 of *Downs*.

The Examiner argues that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify *Janczak* to employ a predetermined rest position in view of *Downs* to reduce "compression vibration". The Examiner specifically cites *Downs* at column 4 lines 4-25 as giving two alternatives, with one being asserted by the Examiner as being a position wherein motoring torque would be decreasing during a restart. However, the examples cited by the Examiner in *Downs* in Column 4 at lines 25-30, are at 60 crank degrees before or after TDC on the **intake** stroke or the **exhaust** stroke of the engine. In other words, *Downs* is teaching the stopping or parking of the engine on either the exhaust stroke or the intake stroke.

Every four-stroke cycle internal combustion engine has two TDC dead center positions. The first top dead center position is at the end of the exhaust stroke and the beginning of the intake stroke. The second top dead center position is at the top of the compression stroke and just before the power stroke. Appellants teach and claim stopping the engine at a point before top dead center on the compression stroke, whereas *Downs* teaches stopping the engine somewhere around top dead center on the exhaust/intake stroke. This difference is hardly surprising, given that Appellants' claimed invention is dedicated to reducing the size of a starter needed for cold starting an engine, whereas *Downs* is dedicated to minimizing compression vibration on the start up of a warmed or fully heated engine. Thus, *Downs* teaches parking an engine where one or more of the intake and exhaust valves are open, so as to have no compression

pressure in the cylinder. *Downs* does not teach anything regarding any reduction in the absolute cranking torque. Appellants, on the other hand, teach parking the engine where both the intake and exhaust valves are closed as is the case during the **compression** and **power** strokes of the engine. This causes cranking torque to be decreased during the first compression event. Accordingly, whether taken singly, or in combination with *Janczak*, *Downs* cannot comprise a colorable basis for a rejection of Appellants' claimed invention as set forth in Claims 9-11 and the Examiner should be reversed.

In the Advisory Action, the Examiner stated that *Downs* is controlling his engine in the claimed manner. This is simply not true, as noted by the Examiner's apparent confusion as to usage to term TDC. The Examiner cites *Downs* as mentioning a benefit of requiring less torque to rotate the crankshaft in his background of the invention. This is true, but only insofar as *Downs* teaches rotating a crankshaft back and forth, before cranking is attempted, to obtain lubricant distribution. This has no relevance whatsoever to the invention at bar. As to the bald statement that *Downs* makes that crankshaft position may affect start up torque, *Downs* merely states that is desirable to park the engine with the valve open - a tactic Appellants clearly disavow. The Examiner also stated in his Advisory Action that "Applicant makes no specific reference to a compression stroke within the specification". This statement is clearly in error, because as noted above, at page 6, lines 18-21, it is said that "Figure 3 depicts the motoring torque through the first compression at a cold cranking temperature at –29°C for a typical engine as it is affected by initial cranking angle". Thus, it is clear that Appellants are dealing with parking the engine on a compression stroke, because as set forth in Appellants' specification and drawings, it is by stopping the engine in this location that the motoring torque is decreasing when the engine is cranked. *Downs* teaches nothing regarding the increasing or decreasing of the torque as the engine is actually cranked. *Downs* is concerned with keeping the valve open so as to avoid compression pressure -- and concomitant vibration -- in the engine. Thus, as noted above neither *Downs* nor *Janczak*, whether taken singly or in combination of with each other, can comprise a colorable basis for the rejection of Appellants' claimed invention as set forth Claims 9-11 and these claims should be passed to issue.

VIII. Claims Appendix

A copy of each of the claims involved in this appeal, namely Claims 9-11, is attached as a Claims Appendix.

IX. Evidence Appendix

None.

X. Related Proceedings

None.

XI. Conclusion

For the foregoing reasons, Appellants respectfully request that the Board direct the Examiner in charge of this case to withdraw the rejection.

Please charge any fees required in the filing of this appeal to deposit account 06-1510.

Respectfully submitted,

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CLAIMS APPENDIX

Claim 1. (Withdrawn) An internal combustion engine having a crankshaft, comprising: a locking mechanism coupled to the crankshaft, said locking mechanism allowing crankshaft rotation in one direction only.

Claim 2. (Withdrawn) The engine of claim 1 wherein said locking mechanism comprises a freewheel clutch.

Clam 3. (Withdrawn) The engine of claim 2 wherein said freewheel clutch is positioned between a gearbox and the engine.

Claim 4. (Canceled)

Claim 5. (Canceled)

Claim 6. (Withdrawn) The engine of claim 5 wherein said locking mechanism comprises pins that engage with a gear coupled to the crankshaft.

Claim 7. (Withdrawn) The engine of claim 5 wherein said locking mechanism comprises ratchets that engage with a gear coupled to the crankshaft.

Claim 8. (Withdrawn) The engine of claim 5 wherein said locking mechanism comprises a friction belt that engages with the crankshaft.

Claim 9. A method for shutting down an internal combustion engine, comprising:

stopping the engine in a predetermined rest position wherein the predetermined rest position is such that motoring torque is decreasing during the first phase of restart; and

locking the engine in said predetermined rest condition via a locking mechanism.

Claim 10. (Original) The method of claim 9 wherein the locking mechanism prevents engine rotation.

Claim 11. (Original) The method of claim 10 wherein said locking mechanism comprises pins that engage with a gear coupled to the crankshaft.

Claim 12. (Withdrawn) The method of claim 10 wherein said locking mechanism comprises ratchets that engage with a gear coupled to the crankshaft.

Claim 13. (Withdrawn) The method of claim 10 wherein said locking comprises a friction belt that engages with the crankshaft.

Claim 14. (Withdrawn) The method of claim 9 wherein the locking mechanism allows the engine to rotate in one direction only.

Claim 15. (Withdrawn) The method of claim 14 wherein said locking mechanism comprises a freewheel clutch.

Claim 16. (Withdrawn) The method of claim 15 wherein said freewheel clutch is positioned between a gearbox and the engine.

Claim 17. (Withdrawn) The method of claim 14 wherein said locking mechanism comprises ratchets that engage with a gear coupled to the crankshaft.